

Remarks Concerning Claim Amendments

Claims 1 – 6 are withdrawn from consideration as a non-elected invention. The Office deems the requirement proper and, after considering Applicants' arguments traversing the restriction requirement, makes the requirement final. Applicants comply with the Office's guidance regarding a complete response by canceling Claims 1 – 6 without prejudice. Applicants reserve their right to file a divisional application for Claims 1 – 6.

Applicants amend Claim 7 to replace the phrase "containing large and small cells defined therein" with wording that explains a "multimodal distribution". The substitute wording draws support from the Application at page 3, line 6 through page 4, line 31, especially page 3, lines 6 – 15 and page 4, lines 13 – 31. Applicants also amend Claim 7 to positively specify the presence of a blowing agent stabilizer prior to specifying the location of the blowing agent stabilizer. The original wording of the Claim provides support for this amendment. With such support, the amendments do not constitute new matter.

Applicants amend Claim 10 to delete all but "non-plasticizing polyalkylene-oxide polymers and copolymers". Applicants submit that the amendments do not constitute new matter.

Remarks Concerning the Rejections

The Office rejects Claims 7 – 20 under 35 U.S.C. 112, second paragraph for use of the terms "large" and "small". The Office states that the claims fail to define the terms. The Office contends that the specification does not provide a standard for ascertaining the requisite degree.

Applicants respectfully disagree with the Office's contention. They believe the specification provides ample guidance for the skilled artisan at page 3, line 6 through page 4, line 31, especially page 3, lines 6 – 15 and page 4, lines 13 – 31. Nonetheless, Applicants amend Claim 7 based upon that portion of the specification to remove any doubt. Applicants respectfully submit that the amendment overcomes any basis for the rejection and ask the Office to withdraw the rejection.

The Office rejects Claims 7 – 20 under 35 U.S.C. 112, second paragraph for use of “defined therein”. The amendment of Claim 7 deletes that term and removes basis for the rejection. Applicants respectfully request withdrawal of the rejection.

The Office rejects Claim 10 under 35 U.S.C. 112, second paragraph for use of the term “non-plasticizing”. Applicants respectfully traverse the rejection. They submit that a skilled artisan readily understands the explanation given at page 3, lines 11 – 24. They also submit that the term “plasticizer” is commonly used by skilled artisans and easily found in a number of standard reference materials such as the Condensed Chemical Dictionary, Twelfth Edition. When combined with the even better known modifier “non –”, Applicants respectfully contend that a skilled artisan has no difficulty ascertaining the scope of the claimed invention. Applicants respectfully ask the Office to withdraw the rejection.

Applicants respectfully question the basis for an apparent requirement to define each term of a claim within the confines of that claim. In order to fully understand the requirement, they ask the Office to provide a citation to support the requirement.

The Office rejects Claims 15 and 17 under 35 U.S.C. 112, second paragraph for use of the term “analogous foam”. Applicants respectfully traverse the rejection as they clearly explain what they mean by that term in the specification at page 7, lines 32 – 35. Applicants ask the Office to withdraw the rejection in view of the cited specification segment.

The Office rejects Claims 7 – 20 under 35 U.S.C. 112, second paragraph based upon Applicants’ use of “proximate” in Claim 7. They guide the Office to the specification at page 17, lines 20 – 26 and submit that a skilled artisan would have no difficulty determining what the term means. They respectfully request withdrawal of the rejection.

The Office rejects Claims 7 – 20 under U.S.C. 102(b) as being anticipated by Paquet et al. (U.S. 5,210,105). The Office suggests that Paquet et al. discloses thermoplastic multimodal foams, materials reading on Applicants’ claimed blowing agent stabilizers, blowing agents, additives and carbon black. The Office

asserts that the particular stabilizers claimed by Applicants would be readily envisioned from the teachings of Paquet et al.

Applicants respectfully traverse the rejection of Claims 7 – 20 under 35 U.S.C. 102(b) over Paquet et al. In order to anticipate Claims 7 – 20, the teachings of Paquet et al. must disclose all of the features embodied in those claims. The teachings of Paquet et al. do not meet that standard and, as such, do not anticipate Claims 7 – 20. In particular, the teachings of Paquet et al. do not teach or suggest, either explicitly or by implication, a blowing agent stabilizer predominately located proximate to large cells as specified in pending Claim 7. The generic reference to “stabilizing agents” at column 3, line 62 and the specific mention of calcium stearate in Example 1 and 2 (column 6, lines 30 and 53) do not teach or suggest any particular or preferred property of the stabilizer, such as an affinity for a blowing agent which is required for a blowing agent stabilizer (see, page 6, lines 19-24 of the present Application). Neither the generic reference nor the specific mention of calcium stearate guide a skilled artisan toward any process or technique that might result in a foam having the claimed distribution of blowing agent stabilizer. A fair reading of Paquet et al. fails to lead a skilled artisan to produce a foam having a stabilizer predominately around the large cells of a multimodal foam. This conclusion is reinforced by the fact that Paquet et al. uses water to prepare a bimodal foam (see, column 4, lines 31-33). The present invention does not use water (see, e.g., page 5, lines 27-28 of the present Application) but rather depends on a blowing agent stabilizer to form large cells. The blowing agent stabilizer then remains substantially proximate to the large cells.

Applicants both claim the preferential blowing agent stabilizer distribution and teach a skilled artisan how to attain that distribution. In addition, nothing in the teachings of Paquet et al. guides a skilled artisan to consider, much less select, the blowing agent stabilizers specified in Claims 10 – 12. Finally, the teachings of Paquet et al. focus on styrenic polymer foams, especially those that contain no more than 30 weight percent of polyolefin. See column 3, lines 27 – 44. Those teaching do not anticipate the polypropylene foam of Claim 12 or the non-styrenic foams possible from the selections in Claim 18.

Paquet et al.’s use of the generic term “stabilizing agents” at column 3, line 62, does not guide a skilled artisan to select a blowing agent stabilizer over any

other stabilizer such as a heat stabilizer or an ultraviolet light stabilizer. It also does not guide a skilled artisan to even try any of the stabilizers embodied in pending Claims 10 – 12, especially the block copolymers of Claims 11 and 12.

Applicants respectfully contend that the differences noted in the preceding paragraphs also serve as barriers to any assertion that Claims 7 – 20, either singly or as a group, are obvious in view of the teachings of Paquet et al. standing alone.

The Office rejects Claims 10 – 12 under 35 U.S.C. 103 (a) as being unpatentable over Paquet et al. (U.S. 5,210,105) and further in view of Gusavage et al. (U.S. 5,670,552) and Chaudhary (U.S. 5,710,186). Applicants respectfully traverse the rejection and ask the Office to withdraw the rejection.

As noted above, Paquet et al. simply mentions “stabilizing agents” as one of many potential “additional additives” at column 3, lines 60 – 63. In doing so Paquet et al. do not support an assertion that any of the blowing agent stabilizers of Claims 10 – 12, particularly the block copolymers and other copolymers of Claims 11 and 12, are prima facie obvious. In other words, the possible use of a stabilizing agent does not guide a skilled artisan to select a blowing agent stabilizer from among various classes of stabilizers as a starting point to begin a search for the particular stabilizers now claimed by the Applicants. As such, Paquet et al., does not render any of Claims 10 – 12 obvious.

Gusavage et al. disclose a process for producing a thermoplastic foam. The process includes use of at least one additive selected from polysiloxane and mineral oil. They theorize that the additive(s) “lubricate(s)” the polymer in order to allow carbon dioxide to mix with and dissolve in the polymer melt with less heat generation. Applicants respectfully suggest that this theory, found at column 4, lines 51 – 64, resembles plasticization, a functionality directly opposed to the “non- plasticizing” requirement of Claim 10. Furthermore, Applicants respectfully suggest that Gusavage et al. cannot guide a skilled artisan to select a blowing agent stabilizer that predominately locates proximate to large cells in a multimodal foam since Gusavage et al. do not disclose multimodal foam.

Gusavage et al. appear to disclose only siloxane homopolymers when they specify polysiloxane at, among other sites, column 5, line 9. Gusavage et al prefer

polydimethylsiloxane, especially an organo- modified dimethyl siloxane at column 5, lines 8 – 14.

Gusavage et al. provide no teaching or suggestion regarding the “polyalkylene-oxide polymers and copolymers” found in pending Claim 10 or any of the copolymers found in pending Claim 11 and 12. Applicants question whether a skilled artisan would consider the broad reference to organo-modified polydimethylsiloxane as a guide to even consider trying the hydroxyl-functionalized polydimethylsiloxane or amine-functionalized polydimethylsiloxane of former Claim 10.

Gusavage et al. disclose a limited number of polysiloxanes. The disclosure of polysiloxanes, whether organo-modified or not, does not equate to a teaching or suggestion to use a siloxane-containing block copolymer. Gusavage et al. uses polysiloxanes interchangeably with mineral oil. See e.g. column 4, lines 20 – 25 and column 5, lines 49 – 51. Gusavage et al. theorizes that polysiloxanes and mineral oil function as lubricants that facilitate control of polymer melt viscosity. See, column 4, lines 15 – 64, especially lines 29 – 36 and 51 – 58. Applicants respectfully submit that this effectively describes the function of a plasticizer. Applicants also submit that none of the blowing agent stabilizers identified in pending claims function as plasticizers. Those in Claim 10 are specifically identified as non-plasticizing. The block copolymers of Claims 11 and 12 have blocks that are more compatible with the resin than with the blowing agent and other blocks that are more compatible with the blowing agent than with the resin as noted on page 9 at lines 1 – 26.

Applicants contend that the specific, very probably plasticizing stabilizers of Gusavage et al. which are not taught in a context of a multimodal foam do not help a skilled artisan build upon the teachings of Paquet et al. to reach the multimodal foam invention embodied in Claims 10 – 12. In other words, the combined teachings of Paquet et al. and Gusavage et al. do not support an assertion of prima facie obviousness, much less obviousness under 35 U.S.C. 103(a).

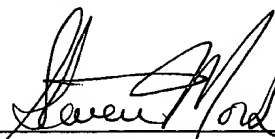
Chaudhary adds nothing to the combined teachings of Paquet et al. and Gusavage et al. that moves a skilled artisan any closer to the invention embodied in Claims 10 – 12. The Examiner points to column 4, line 66 through column 5, line 13 of Chaudhary as evidence of stabilizers. However, Applicant understands that section of

Chaudhary to disclose thermoplastic alkenyl aromatic polymers suitable for foaming as opposed to stabilizers for use in foaming.

Chaudhary focuses a skilled artisan's attention on enhancing dispersion of titanium dioxide particulates in a thermoplastic melt material by way of coating a substantial portion of particulate surfaces with a wetting material. The wetting agents are described at column 3, lines 50 – 67. The wetting agent may be any of a number of compounds, only one of which is a polyalkylene glycol. The listing and examples provide no guidance regarding any preference for a particular wetting agent. The listing does not include any of the compounds listed in pending Claims 11 and 12. Even where there is a potential overlap as in the case of a polyalkylene glycol, the wetting agent is simply a surface coating on titanium dioxide particulates. As such, the wetting agent likely remains predominately around the titanium dioxide particulates. Moreover, Chaudhary does not even mention multimodal foams, therefore the teaching of Chaudhary cannot supplement Paquet or Gusavage to guide a skilled artisan to selecting a blowing agent stabilizer that is predominately proximate to the large cells of a multimodal foam. Applicants respectfully submit that Chaudhary, whether taken alone or in conjunction with either or both of Paquet et al. and Gusavage et al. fails to establish prima facie obviousness of Claims 10 – 21, much less obviousness under 35 U.S.C. 103(a).

Applicants respectfully request allowance of Claim 7 – 20 at an early date. As this paper is mailed within the shortened statutory period and does not add any claims, no additional fees should be due. As a precautionary measure, if Applicants err in their belief that no added fees are due, Applicants authorize the Office to assess the appropriate fees against Deposit Account # 04-1512.

Respectfully submitted,



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WHAT IS CLAIMED IS:

1. (Cancelled)
2. (Cancelled)
3. (Cancelled)
4. (Cancelled)
5. (Cancelled)
6. (Cancelled)
7. (Currently amended) A thermoplastic polymer foam comprising a thermoplastic polymer resin having a multimodal cell size distribution ~~containing large and small cells defined therein,~~ the multimodal cell size distribution being shown by a plot of representative cross-sectional area versus cell size that has two or more peaks, one of which corresponds to the smallest cell size(s) and represents small cells and another of which corresponds to the largest cell size(s) and represents large cells, and a blowing agent stabilizer, the blowing agent stabilizer being predominantly located proximate to the large cells.
8. (Original) The thermoplastic polymer foam of Claim 7, wherein said foam contains one to 50 weight-percent of a blowing agent stabilizer relative to thermoplastic polymer resin weight.
9. (Original) The thermoplastic polymer foam of Claim 7, wherein said foam has a bimodal cell size distribution.
10. (Currently amended) The thermoplastic polymer foam of Claim 7, wherein the blowing agent stabilizer is selected from a group consisting of non-plasticizing polyalkylene-oxide polymers and copolymers, ~~non plasticizing polydimethylsiloxane and non-plasticizing functionalized polydimethylsiloxane.~~

11. (Original) The thermoplastic polymer foam of Claim 7, wherein the thermoplastic polymer resin is polystyrene and the blowing agent stabilizer is selected from a group consisting of polystyrene/polydimethylsiloxane block copolymers, polystyrene/polyoxyethylene block copolymers, polybutyl(meth)acrylate/polysiloxane/polybutyl(meth)acrylate block copolymers, polyethylene oxide grafted polystyrene/maleic anhydride random copolymers, and ethylene glycol grafted polyurethane random copolymers.

12. (Original) The thermoplastic polymer foam of Claim 7, wherein the thermoplastic polymer resin is polypropylene and the blowing agent stabilizer is selected from a group consisting of polypropylene/polydimethylsiloxane block copolymers and polypropylene/polyoxyethylene block copolymers.

13. (Original) The thermoplastic polymer foam of Claim 7, further comprising a thermal insulating enhancing additive selected from a group consisting of carbon black (coated and non-coated) and graphite.

14. (Original) The thermoplastic polymer foam of Claim 7, wherein said foam has an R-value of at least $4.4^{\circ}\text{F}\cdot\text{ft}^2\cdot\text{h}/\text{Btu}\cdot\text{in}$ ($30.5\text{ K}\cdot\text{m}/\text{W}$).

15. (Original) The thermoplastic polymer foam of Claim 7, wherein said foam has an R-value at least $0.2^{\circ}\text{F}\cdot\text{ft}^2\cdot\text{h}/\text{Btu}\cdot\text{in}$ ($1.4\text{ K}\cdot\text{m}/\text{W}$) greater than an analogous foam prepared in the absence of blowing agent stabilizer.

16. (Original) The thermoplastic polymer foam of Claim 7, wherein said foam has a density of 0.5 to 50 pounds per cubic foot (8.0 to 801 kilograms per cubic meter).

17. (Original) The thermoplastic polymer foam of Claim 7, wherein said foam has a lower density than an analogous foam prepared in the absence of blowing agent stabilizer.

18. (Original) The thermoplastic polymer foam of Claim 7, wherein said thermoplastic polymer is selected from a group consisting of polystyrene, syndiotactic polystyrene, polypropylene, polyethylene, ethylene/propylene copolymers, ethylene/styrene copolymers, polymethylmethacrylate, polyethylene terephthalate, polycarbonate, polylactic acid, thermoplastic polyurethane, and polyethersulfone.

19. (Original) An article of manufacture comprising the thermoplastic polymer foam of Claim 7.

20. (Original) The article of manufacture of Claim 19, wherein said article is thermally insulating.